BOOK REVIEWS

The Frackers: The Outrageous Inside Story of the New Billionaire Wildcatters by Gregory Zuckerman (Portfolio, 2013) 416 pages. ISBN 978-1591846451

The shift to unconventional oil and gas resources in the past 15 years is a spectacular episode of technological innovation with stark implications across energy markets. This book offers a popular account of some central players involved in the technological revolution and the resulting gas and oil bonanza. Drawing on his experience as a journalist for *The Wall Street Journal* and as a popular financial author (*The Greatest Trade Ever*), Zuckerman paints a colorful portrait of the technical insights, bullish gambles, outsized personalities, and financial volatility that punctuated the transition in the United States from depleted conventional fields to unexpected resource abundance in both natural gas and liquids.

Zuckerman's account divides the story into two acts: breakthrough and race. As in other popular narratives (Yergin, 2011), the breakthrough is largely credited to George Mitchell and Mitchell Energy in the Barnett Shale. Zuckerman offers greater detail about the cast of characters and internal debates within Mitchell Energy, such as the role of exploration geologist Kent Bowker and petroleum engineer Nick Steinsberger. Bowker was bullish on the Barnett, but the program to unlock gas was not always smooth and universally agreed-upon within the company. Mitchell remained convinced the Barnett would deliver the gas, in part because his back was to the wall.

From a broader perspective, Mitchell Energy was forced to innovate by its medium size. It was large enough to have a substantial delivery contract, and also large enough to finance a sizable drilling program. The contractual bind created by an essential natural gas supply contract and declining production from conventional fields motivated the persistence in drilling wells using experimental techniques. While majors and many independents ventured offshore and abroad during the 1990s, Mitchell continued to drill wells in North Texas, tweaking the design until the shale finally gave up its riches. Mitchell was not large enough to play in the higher-ante game offshore and overseas. Chevron was one company with capable staff and ample resources to unlock the secrets of the Barnett, but which grew impatient and moved on to other projects.

The story is not quite as simple as Mitchell doggedly drilling until the right combination of inputs came together. Other firms were experimenting contemporaneously, and competition was fierce. Many geologists knew the extent of the Barnett and that it held gas. Hydraulic fracturing, water flooding, and horizontal drilling were all well-known, though the particular combination of them that would make unconventionals economic was elusive. Mitchell observed Oryx Energy's short-lived success with horizontal wells in the 1980s and Devon Energy's results with fractured vertical wells. Combining the two created engineering challenges that required tweaking the formula. Steinsberger claims that the shift to water fracs came from a job in which a gel frac did not properly mix, but the well nonetheless performed better than expected. Not all of the breakthrough was serendipity. Other plays, including the Austin Chalk, receive some credit insofar as providing contrasting geology that helped engineers and geologists think about what makes shale different. Less credit is afforded to basins outside Texas, such as knowledge spillovers from the NETL eastern shale project and western tight gas. However, those other projects provided possible information spillovers. By 1998, Mitchell had pieced the puzzle together, and a string of productive wells in the Barnett started the race.

The breakthrough is described in a fast-moving hundred pages, setting the stage for the breakneck pace of the race to exploit the new technology. The story of the race is an intertwining narrative focusing on three firms and four personalities: Chesapeake Energy and its founders Tom Ward and Aubrey McClendon; Continental Resources and its founder Harold Hamm; and Cheniere Energy with LNG visionary née banker cum restaurateur Charif Souki. Other players duck in and

out of the story, which flips back and forth between the various players in rapid-fire succession, like cut-shots from an action thriller.

In an industry where company executive teams are often differentiated as predominantly engineers or geologists, Chesapeake Energy is an anomaly. Its founders were landmen, contracting specialists who acquire leases and negotiate agreements. As such, rather than building on superior engineering or geologic knowledge, Chesapeake was built on the strength of deep understanding of both contracting and financing. This forced the company into an aggressive posture on both ends of the upstream—in active leasing and by creatively financing additional drilling. By actively leasing promising acreage, Chesapeake thought it could support a high enough valuation to pay for both the leasing and subsequent drilling: the so-called "resource thesis." The desire to control large acreages in every play led to some expensive late entries, such as in the Fayetteville Shale in Arkansas. Chesapeake's aggressive leasing has led to allegations of collusion with another company in a marginal shale play in Michigan. While signing new leases has always been a priority, the company has suffered in its relations with lessors and especially royalty owners.

The second leg of the business model was financial, and consisted largely of procuring favorable reviews from Wall Street analysts to support additional equity offerings to pay for more leasing and drilling. One innovation was the creation of volumetric production payments, which effectively pre-sold gas for cash. Chesapeake was unusual in the degree to which the corporate and personal finances of its founders were intertwined. McClendon and Ward owned shares of individual wells, and they sold their shares of production for cash to buy still larger stakes from Chesapeake. Corporate gas hedges were directed by McClendon and Ward, who concurrently were hedging their personal positions. This practice led to tension with board members and eventually an SEC investigation of McClendon (which was ultimately dropped). After making and losing massive personal fortunes on the back of Chesapeake, both Ward and McClendon each left the company.

Chesapeake Energy has maintained its reputation despite its founders' departures, but the story follows McClendon and Ward. The subsequent act of the serial entrepreneurs was predictable—they each spearheaded new companies trying to cash in on the promise of unconventional resources. Ward left in 2006 and started SandRidge Energy. McClendon was edged out of Chesapeake in 2012 and started New America Energy. Aggressive financing has been the hallmark of both firms, which are among the hundreds now chasing the sweet spots of unconventional plays.

Harold Hamm founded his first energy company at the age of 20, scratching out a living in the oilfields of western Oklahoma. Twenty-five years later he renamed his company Continental Resources, perhaps foreshadowing his ambitions to grow beyond his native province. Hamm's story differs from McClendon and Ward's—he worked his way up through the oil patch, driving a truck and cleaning tanks before bootstrapping himself up, successfully buying and drilling wells and funding his own education. That experience contributed to Hamm's championing of small oil and gas companies even today.

Also unlike Chesapeake, Hamm was focused on oil rather than natural gas. When the importance of the technical breakthrough dawned on Hamm, he cast his eyes north to the Bakken Shale under Montana and North Dakota. After taking an early stake in the Elm Coulee field in Montana, in 2003 and 2004, Continental worked its way east into thicker and more mature reservoir rocks across the North Dakota border. With the help of geologists Jack Stark and Brian Hoffman, Hamm and Continental found the right combination of inputs in North Dakota in 2004.

Hamm's timing was good because North Dakota was about to become very, very popular. In April 2008, the USGS updated its estimates of the oil content of the Bakken by 20–30 times. Zuckerman details the duel between Hamm and Mark Papa of EOG Resources for acreage in the "yolk of the egg," as Hamm put it. Wildcatting is not for the timid. Large acreage was available, but leasing and holding leases takes money. Hamm experienced one of several inopportune downturns in 2008. He was not alone—McClendon, Ward, and many other exploration companies were suddenly pinched by crashing prices. Using cash to buy leases that must be drilled at high cost to

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be held will allow a firm to establish a dominant position in a play, but it is not good for the short-term health of a balance sheet.

In contrast to Hamm, McClendon, and Ward, who have drilled thousands of successful wells, Charif Souki has almost one energy success to his credit. His journey has been every bit as volatile as that of the wildcatters. Souki initially formed Cheniere as a production company, but found gas hard to find and extract profitably at the low prices of the late 1990s. After only a few years as an exploration and production neophyte, Souki turned overseas to find cheap gas, and changed his focus to building an LNG import terminal on the Gulf Coast. In 2000, he hatched a plan to build LNG import terminals, but he was far behind other competitors. Cheniere's stock price oscillated on the scale of the capital needed to build an LNG facility, then a bout of perceived resource scarcity, then the slow realization that domestic unconventional production could provide an embarrassment of riches. On the very day in 2008 that Souki presided over the opening of an import terminal, the company was downgraded and the stock lost over one third of its value in a single day.

With his company and import dreams teetering, and thanks to a phone call from Aubrey McClendon, in early 2009 Souki grasped the monumental shift to unconventional resources and raced to the front of the line to apply for permits to export LNG. The price tag was daunting—$8 billion to just convert the existing import facility. So the narrative around Souki pertains to the delicate dance between offices—of investors and investment banks in search of funds, and of regulators and bureaucrats in search of permits and approvals. Souki has played that game successfully, placing Cheniere as the likely initial exporter of LNG (in late 2015), and also earning him the highest executive compensation in the United States last year. Zuckerman does not delve into the tradeoffs associated with LNG and focuses instead on the business development story, which is strongly tinted with optimism given Cheniere's current market position.

I found the fluid narrative a delight seldom granted in more formal academic outlets with a strong core message of technological breakthrough, risk and return, and cutthroat competition. One omission is that the book makes only passing reference to environmental concerns associated with expanded oil and gas production that loom so large in the popular imagination. From the perspective of the researcher, the omission of an index is an annoyance. Nor did I find the human interest asides nearly as compelling and evocative as the story of the main characters.

The mechanics of corporate administration during the unconventional boom might be better suited to a business classroom than *The Energy Journal*. However, Zuckerman's version of events provides glimpses of phenomena that economists have long found enthralling: the dogged persistence and careful attention to detail of learning-by-doing; the mechanics of contracting for resources; the financial innovations and machinations of cash-strapped operators; the workaday ethic of a bootstrapping entrepreneur; and the broad and bold stroke risk and return of international trade. While the popular business packaging of *The Frackers* might put off some economists in search of denser material, the accessibility and currency of this book make it valuable to any economist interested in how the pivot to unconventional resources has affected the oil and gas business, particularly the upstream sector.

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Globalizing Oil: Firms and Oil Market Governance in France, Japan, and the United States, by Llewelyn Hughes. (Cambridge University Press, Cambridge, UK. 2014), 254 pages, hardcover US$95.00, ISBN 9781107041998

This book is a study of changes in oil market governance in the advanced industrialized countries over the last 30 years based upon case studies of France, Japan and the United States.

Two hypotheses underlie the analysis. The first hypothesis is what Hughes calls "industrial compacts" which shaped the characteristics of the oil companies operating in these environments. These "compacts" were agreements negotiated between the companies and the governments in earlier stages of the industry. They regulated market share and shaped the organizational structure and incentives of the oil companies in each of the markets. Because these "compacts" were bargained outcomes between business and government, inevitably they differed across countries because of the different contexts and histories. The second hypothesis is that these characteristics of the oil companies affected the types of demand they made on the policy makers, which in turn influenced the way in which the governments chose to oversee the oil markets in those countries. Thus, the outcome of the interactions is determined by the nature of these demands and the incentives governments have to acquiesce to the demands. The results set the direction of travel and the governance of the oil sector within the country concerned. For example, in some cases the "compact" produced more diversified and large firms that were less likely to respond to the shift in opportunities. Firms were less likely to demand support from the state, while smaller firms in only one section of the oil industry value chain would continue to demand government support. Thus, Hughes argues that only by identifying the origins of firm heterogeneity and how this affected the ways firms tried to renegotiate the institutional status quo, is it possible to understand the patterns of change in oil market governance.

The book examines these two hypotheses in the context of three case studies, France, Japan and the United States. France and Japan are chosen because they present similar contexts, specifically the lack of a significant domestic resource base for oil. The United States is added to complement the first case studies in two ways. First in terms of the industry structure there are within-case variations with major vertically integrated international firms along side small and medium sized firm focusing on particular segments of the value chain in a purely domestic context. This division allows an examination of the effects of oil company characteristics on their strategy to government while holding national political institutions constant. It also allows examination of how the "compacts" interacted with domestic resource endowments to shape the characteristics of the firms and therefore the strategies they took towards governance.

The overall aim of the book is to explain changes in the way the advanced industrialized states governed their oil markets, which of itself is an ambitious objective. Part of the reason for the complexity is that the oil sector is operating in a wider milieu. It is therefore subject to a great many pressures and influencing variables both endogenous and exogenous. Some of these are used in Hughes' analysis although at times some of the arguments over cause and effect and the direction of travel between company and government might be disputed and some appear to be understated. One such area relates to what might be called the "political cycle."[1] This concerns the ideological basis for government intervention (or absence of intervention) in an economy. Thus there was a clear cycle whereby the consensus view in Western economies of the need for government intervention post World War II is gradually reversed in the 1980s and 1990s by the encroachment of the "Washington Consensus" based upon the economic theory of politics and theories of public choice. The book has limited discussion on the role of ideology in the economic role of government although to be fair references are scattered throughout the analysis. Hughes argues that the changes

1. Paul Stevens (2008), "National Oil Companies and International Oil Companies in the Middle East: Under the Shadow of Government and the Resource Nationalism Cycle." *Journal of World Energy Law and Business* 1(1): 5–30.

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in oil market governance in the past three decades characterized by "partial liberalization" was "surprising." However, it is always dangerous to neglect the power of Keynes' "academic scribblers" and more attention to their role in oil markets might have reduced the element of surprise.

Arguably the greatest contribution of the book, which is very well written and very thoroughly researched, is that the three case studies give an excellent and plausible factual narrative on the history of the domestic oil sector in the three countries. This in itself represents a major contribution to the literature and will be of great value to all students interested in the history of the oil industry. Another contribution that may have been unintended is that stories clearly show it is impossible and indeed undesirable for governments simply to leave the oil sector to the whims of market forces. The book well illustrates, especially in the United States, that one of the first things governments learn about market forces is that the market forces them to intervene left right and centre in any economy, especially in the oil sector where there are so many sources of market failure.

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Wheel of Fortune: The Battle for Oil and Power in Russia by THANE GUSTAFSON. (Belknap Press of Harvard University Press, 2012) 662 pages, ISBN 978-0-674-06647-2, Amazon Price Hardcover $30.79, Kindle Edition $26.49.

When contemplating the transition of the Russian oil industry from communism to capitalism, I can't help think about Churchill's comment in a wartime speech about Russia being a "a riddle wrapped in a mystery inside an enigma." Dr. Gustafson's lifetime study of the Soviet/Russian economy, personal acquaintance with many of the main actors, and well researched account of this transition for the oil and gas industry has made these changes less enigmatic for me.

This book takes up the oil and gas story, where Gustafson (1989) leaves off. In this earlier book, Soviet energy policy is chronicled from the 1970's through the late 1980s from a bit broader lens with some discussion of coal and nuclear power. It discussed the oil crisis in the late 1970s, Breshnev's resource intensive response to stem the stagnation, and gas abundance providing some respite. Gustafson suggests that problems in the oil market as well as in the wider economy that contributed to the demise of the USSR can be attributed to both systemic causes as well as mistakes in leadership.

This newer volume continues this theme and focuses more exclusively on oil and gas and chronicles their changes with the collapse of the USSR and the resurrection of Russia. Given the role of the government in markets, the political changes are always a backdrop both before and after the collapse of the USSR. Although the book's point of view is more from that of a political scientist there is an acknowledgement of economic ideas as well. As an economist I also appreciated the insights on how the political changes impacted the economic operation of the oil and gas industry.

The introduction lays out many of the themes that reoccur throughout the book. Why oil and gas matter to Russia, why their roles and evolution differed, how they form a core within the economy, and their role in Russia's reintegration into the international economy. Gustafson reminds us that Russia is not really a petrostate but rather an advanced but inefficient industrial and technological power with a well developed political system staffed by well-educated professionals. Oil is not a curse but it has shorn up an economy in turmoil with the economic disruption, abrupt re-entry into the world economy while still mired in the Soviet legacy—"physical, technological,

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cultural and political." It also has promoted more corruption and rent seeking while reducing budgetary discipline and the pace of needed reform.

Westerners immersed in the capitalism tradition thought with the fall of communism and rise of capitalism all would be good. Gustafson shows us otherwise and argues that Gorbachev's *perestroika* was a "blend of good intentions, bad economics, and fatal political naivete." Although there were winners in the battle for Soviet legacy rents and later the global windfall rents from high oil prices, there were many losers and much resentment of West. There was the humiliation of the collapse from super power status with more insult from the invasion of western brands, ideas, arrogance, and technology. Within the oil industry and the economy, you see the same tension between the reformers with a bent toward markets, private ownership, and foreign ideas and the old guard that looked towards known technology within the oil industry and an authoritarian but paternalistic state.

Within the book, chapters 1-5 describe the collapse of the oil industry and how a weakened Russian state allowed five independent oil companies to form—Lukoil, Yukos, Surgutneftegaz, Sibneft, and Rosnet, which remained state owned. Each company had its own champion or champions, history, culture and corporate strategy that are recounted in these chapters. In these chapters we also see the arrival of foreign interests, and the oil miracle from 1999-2004 as a new line of financial entrepreneurs were overtaking the old guard of geologists, engineers and Soviet oilmen.

Chapters 6-8 give an account of the rise of Putin and his home city of St. Petersburg along with the rise and fall of others from St. Petersburg, known as Pitersy. A fascinating account of the Yukos affair is given and the battle Putin won to consolidate and put the majority of the oil industry back under state control in the state-owned champion Rosneft was largely accomplished by 2005.

The remainder of the book is less dramatic but indicates happenings from the mid 2000's to the book's publication date. It follows the tax debates and changes, the recession of 2008-2009, which hit the Russian economy hard, and discusses Russian regulation of the oil industry. It comes back to foreign companies in Russia along with increasing Russian oil costs and the need for foreign technology. Although there has been increased foreign participation, the author argues that the Russian industry is still quite isolated and indicates why. The re-occurring theme of increasing costs rises. There is the reiteration of the need for resuscitating brownfields, developing greenfields (the remote onshore), as well as moving towards the even more difficult Arctic offshore, which the author calls "blue fields." He argues for reforms in taxes and regulations that can off stave declining production and discusses some high price and low price scenarios and their implications for Russia in the concluding chapter.

This book is suitable for a general audience. It has an index and is a good reference for those wanting to know the historical chronology of events in the Russian oil industry for the past couple of decades. It also provides analysis of underlying tensions and motivations that may provide some insights for the future. I very much enjoyed this book, although at times I got lost in some of the Russian names, acronyms and words. I learned much about the chronology of events as the USSR came apart, as the Russian oil industry came apart, and then as Putin strengthened the state and re-consolidate the majority of oil and gas back under state control. I appreciated seeing the human face put to the bureaucracy and being reminded of the many dedicated and talented individuals who made oil and gas come out of the ground under extremely difficult circumstances and the many who made an unworkable situation work. The sections on the battles for wealth, for power and for survival made for an entertaining read with blockbuster potential.

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